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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Brent Iverson, George Georgiou
and Gang Chen

Group Art Unit: 1641

Examiner: P. Do

Serial No.: 08/847,063

Atty. Dkt. No.: MXGN:005

Filed: May 1, 1997

For: DIRECTED EVOLUTION OF ENZYMES
AND ANTIBODIES

REQUEST FOR TRANSFER OF SEQUENCE LISTING UNDER 37 C.F.R. § 1.821(e)

BOX SEQUENCE

Commissioner for Patents
Washington, D.C. 20231

Commissioner:

Pursuant to 37 C.F.R. § 1.821(e), Applicants respectfully request that the sequence information previously submitted in parent application ("parent application"), U.S. Serial No. 08/847,063 filed May 1, 1997, be transferred to and used in the above-referenced patent application ("instant application"). Only one computer readable sequence listing was submitted to the U.S. Patent and Trademark Office in the parent application. The sequence information in the instant application is identical to the sequence information contained in the previously-filed computer readable sequence listing in the parent application. It is understood that the U.S. Patent and Trademark Office will make the necessary change in application number and filing date of

the computer readable form that will be used for the instant application. A paper copy of the sequence listing is included in the originally-filed specification of the instant application.

Applicants request the transfer of the previously-filed computer readable sequence listing from the parent application to the instant application is in lieu of filing a duplicate computer readable sequence listing.

No fee is believed to be due in connection with the filing of this document; however, should any fees under 37 C.F.R. §§ 1.16 to 1.21 be deemed necessary for any reason relating to this document, the Commissioner is hereby authorized to deduct said fee from Fulbright & Jaworski Account No.: 50-1212/08001973/SLH.

Respectfully submitted,



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Date: February 12, 2001

SEQUENCE LISTING

(1) GENERAL INFORMATION:

- (i) APPLICANT: Iverson, Brent
Georgiou, George
Chen, Gang
Olsen, Mark J.
Daugherty, Patrick S.
- (ii) TITLE OF INVENTION: Directed Evolution of Enzymes and Antibodies
- (iii) NUMBER OF SEQUENCES: 53
- (iv) CORRESPONDENCE ADDRESS:
 - (A) ADDRESSEE: ARNOLD, WHITE AND DURKEE
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 - (C) CITY: Houston
 - (D) STATE: Texas
 - (E) COUNTRY: USA
 - (F) ZIP: 77210-4433
- (v) COMPUTER READABLE FORM:
 - (A) MEDIUM TYPE: Floppy disk
 - (B) COMPUTER: IBM PC compatible
 - (C) OPERATING SYSTEM: PC-DOS/MS-DOS
 - (D) SOFTWARE: PatentIn Release #1.0, Version #1.30
- (vi) CURRENT APPLICATION DATA:
 - (A) APPLICATION NUMBER: US UNKNOWN
 - (B) FILING DATE: CONCURRENTLY HEREWITH
 - (C) CLASSIFICATION: UNKNOWN
- (viii) ATTORNEY/AGENT INFORMATION:
 - (A) NAME: Highlander, Steven L.
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(2) INFORMATION FOR SEQ ID NO:1:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 780 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: single
 - (D) TOPOLOGY: linear
- (ix) FEATURE:
 - (A) NAME/KEY: CDS
 - (B) LOCATION: 1..780

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:1:

| | |
|---|-----|
| GAA GTT CAA CTG CAA CAG TCT GGT CCT GAA TTG GTT AAA CCT GGC GCC | 48 |
| Glu Val Gln Leu Gln Gln Ser Gly Pro Glu Leu Val Lys Pro Gly Ala | |
| 1 5 10 15 | |
| TCT GTG CGC ATG TCC TGC AAA TCC TCA GGG TAC ATT TTC ACC GAC TTC | 96 |
| Ser Val Arg Met Ser Cys Lys Ser Ser Gly Tyr Ile Phe Thr Asp Phe | |
| 20 25 30 | |
| TAC ATG AAT TGG GTT CGC CAG TCT CAT GGT AAG TCT CTA GAC TAC ATC | 144 |
| Tyr Met Asn Trp Val Arg Gln Ser His Gly Lys Ser Leu Asp Tyr Ile | |
| 35 40 45 | |
| GGG TAC ATT TCC CCA TAC TCT GGG GTT ACC GGC TAC AAC CAG AAG TTT | 192 |
| Gly Tyr Ile Ser Pro Tyr Ser Gly Val Thr Gly Tyr Asn Gln Lys Phe | |
| 50 55 60 | |
| AAA GGT AAG GCC ACC CTT ACT GTC GAC AAA TCT TCC TCA ACT GCT TAC | 240 |
| Lys Gly Lys Ala Thr Leu Thr Val Asp Lys Ser Ser Ser Thr Ala Tyr | |
| 65 70 75 80 | |
| ATG GAG CTG CGT TCT TTG ACC TCT GAG GAC TCC GCG GTA TAC TAT TGC | 288 |
| Met Glu Leu Arg Ser Leu Thr Ser Glu Asp Ser Ala Val Tyr Tyr Cys | |
| 85 90 95 | |
| GCC GGC TCC TCT GGT AAC AAA TGG GCC ATG GAT TAT TGG GGT CAT GGT | 336 |
| Ala Gly Ser Ser Gly Asn Lys Trp Ala Met Asp Tyr Trp Gly His Gly | |
| 100 105 110 | |
| GCT AGC GTT ACT GTG AGC TCT GGT GGC GGT GGC TCG GGC GGT GGT GGG | 384 |
| Ala Ser Val Thr Val Ser Ser Gly Gly Gly Ser Gly Gly Gly Gly | |
| 115 120 125 | |
| TCG GGT GGC GGC GGA TCA GAC ATA GTA CTG ACC CAG TCT CCA GCT TCT | 432 |
| Ser Gly Gly Gly Gly Ser Asp Ile Val Leu Thr Gln Ser Pro Ala Ser | |
| 130 135 140 | |
| TTG GCT GTG TCT CTA GGA CAA AGG GCC ACG ATA TCC TGC CGA TCC AGC | 480 |
| Leu Ala Val Ser Leu Gly Gln Arg Ala Thr Ile Ser Cys Arg Ser Ser | |
| 145 150 155 160 | |
| CAA AGT CTC GTA CAT TCT AAT GGT AAT ACT TAT CTG AAC TGG TAC CAA | 528 |
| Gln Ser Leu Val His Ser Asn Gly Asn Thr Tyr Leu Asn Trp Tyr Gln | |
| 165 170 175 | |
| CAG AAA CCA GGA CAG CCA CCC AAG CTT CTC ATC TAT AAG GTA TCC AAC | 576 |
| Gln Lys Pro Gly Gln Pro Pro Lys Leu Leu Ile Tyr Lys Val Ser Asn | |
| 180 185 190 | |
| CGA TTC TCT GGA GTC CCT GCC AGG TTC AGT GGC AGT GGG TCT GAG TCA | 624 |
| Arg Phe Ser Gly Val Pro Ala Arg Phe Ser Gly Ser Gly Ser Glu Ser | |
| 195 200 205 | |
| GAC TTC ACC CTC ACC ATC GAT CCT GTG GAG GAA GAT GAT GCT GCA ATA | 672 |
| Asp Phe Thr Leu Thr Ile Asp Pro Val Glu Glu Asp Asp Ala Ala Ile | |
| 210 215 220 | |

| | |
|---|-----|
| TAT TAC TGT AGC CAA ACT ACG CAT GTT CCA CCC ACG TTC GGC TCG GGG | 720 |
| Tyr Tyr Cys Ser Gln Thr Thr His Val Pro Pro Thr Phe Gly Ser Gly | |
| 225 230 235 240 | |
| ACC AAG CTG GAG CTG AAA CGT GCT AGC CAG CCA GAA CTC GCC CCG GAA | 768 |
| Thr Lys Leu Glu Leu Lys Arg Ala Ser Gln Pro Glu Leu Ala Pro Glu | |
| 245 250 255 | |
| GAC CCC GAG GAC | 780 |
| Asp Pro Glu Asp | |
| 260 | |

(2) INFORMATION FOR SEQ ID NO:2:

- (i) SEQUENCE CHARACTERISTICS:
- (A) LENGTH: 260 amino acids
 - (B) TYPE: amino acid
 - (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:2:

| | |
|---|--|
| Glu Val Gln Leu Gln Gln Ser Gly Pro Glu Leu Val Lys Pro Gly Ala | |
| 1 5 10 15 | |
| Ser Val Arg Met Ser Cys Lys Ser Ser Gly Tyr Ile Phe Thr Asp Phe | |
| 20 25 30 | |
| Tyr Met Asn Trp Val Arg Gln Ser His Gly Lys Ser Leu Asp Tyr Ile | |
| 35 40 45 | |
| Gly Tyr Ile Ser Pro Tyr Ser Gly Val Thr Gly Tyr Asn Gln Lys Phe | |
| 50 55 60 | |
| Lys Gly Lys Ala Thr Leu Thr Val Asp Lys Ser Ser Ser Thr Ala Tyr | |
| 65 70 75 80 | |
| Met Glu Leu Arg Ser Leu Thr Ser Glu Asp Ser Ala Val Tyr Tyr Cys | |
| 85 90 95 | |
| Ala Gly Ser Ser Gly Asn Lys Trp Ala Met Asp Tyr Trp Gly His Gly | |
| 100 105 110 | |
| Ala Ser Val Thr Val Ser Ser Gly Gly Gly Ser Gly Gly Gly Gly | |
| 115 120 125 | |
| Ser Gly Gly Gly Gly Ser Asp Ile Val Leu Thr Gln Ser Pro Ala Ser | |
| 130 135 140 | |
| Leu Ala Val Ser Leu Gly Gln Arg Ala Thr Ile Ser Cys Arg Ser Ser | |
| 145 150 155 160 | |
| Gln Ser Leu Val His Ser Asn Gly Asn Thr Tyr Leu Asn Trp Tyr Gln | |
| 165 170 175 | |
| Gln Lys Pro Gly Gln Pro Pro Lys Leu Leu Ile Tyr Lys Val Ser Asn | |
| 180 185 190 | |

Arg Phe Ser Gly Val Pro Ala Arg Phe Ser Gly Ser Gly Ser Glu Ser
195 200 205

Asp Phe Thr Leu Thr Ile Asp Pro Val Glu Glu Asp Asp Ala Ala Ile
210 215 220

Tyr Tyr Cys Ser Gln Thr Thr His Val Pro Pro Thr Phe Gly Ser Gly
225 230 235 240

Thr Lys Leu Glu Leu Lys Arg Ala Ser Gln Pro Glu Leu Ala Pro Glu
245 250 255

Asp Pro Glu Asp
260

(2) INFORMATION FOR SEQ ID NO:3:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 18 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: single
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:3:

TGGACCAACA ACATCGGT

18

(2) INFORMATION FOR SEQ ID NO:4:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 26 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: single
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:4:

CCCATATCAC CAGCTCACC G TCTTTC

26

(2) INFORMATION FOR SEQ ID NO:5:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 32 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: single
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:5:

GACCCCGAGG ACTAACGTCT TCGAATAAAT AC

32

(2) INFORMATION FOR SEQ ID NO:6:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 25 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: single
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:6:

CCGAATTCGT TTGAACATGC CTAAC

25

(2) INFORMATION FOR SEQ ID NO:7:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 29 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: single
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:7:

CGGAATTCGT GCGCAACACG ATGAAGCTC

29

(2) INFORMATION FOR SEQ ID NO:8:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 31 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: single
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:8:

AGGGCATGCA AGGGCACCAA TAACTGCCTT A

31

(2) INFORMATION FOR SEQ ID NO:9:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 26 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: single
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:9:

TTGGCTGCAG TAATATATTG CAGCAT

26

(2) INFORMATION FOR SEQ ID NO:10:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 31 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: single
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:10:

TGCAATATAT TACTGCAGCC AAACACGCA T

31

(2) INFORMATION FOR SEQ ID NO:11:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 30 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: single
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:11:

CGGCAGTTTC TGCAGATATA TTCGCAAGAT

30

(2) INFORMATION FOR SEQ ID NO:12:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 31 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: single
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:12:

CTTGCGAATA TATCTGCAGA AACTGCCGGA A

31

(2) INFORMATION FOR SEQ ID NO:13:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 40 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: single
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:13:

ACGCCACATC TTGCGAATAT ATCTGCAGAA ACTGCCGGAA

40

(2) INFORMATION FOR SEQ ID NO:14:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 18 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: single
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:14:

CAGGGTACAT TTTCACCG

18

(2) INFORMATION FOR SEQ ID NO:15:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 46 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: single
 - (D) TOPOLOGY: linear
- (ix) FEATURE:
 - (A) NAME/KEY: modified_base
 - (B) LOCATION: one-of(13, 14, 22, 23, 28, 29)
 - (D) OTHER INFORMATION: /note= "N = A, C, T or G"

- (ix) FEATURE:
 - (A) NAME/KEY: modified_base
 - (B) LOCATION: one-of(15, 24, 30)
 - (D) OTHER INFORMATION: /note= "B = C, G or T"

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:15:

AACTGCAGCC AANNBACGCA TNNBCCANNB ACGTTCGGCT CGGGGA

46

(2) INFORMATION FOR SEQ ID NO:16:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 63 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: single
 - (D) TOPOLOGY: linear
- (ix) FEATURE:
 - (A) NAME/KEY: modified_base
 - (B) LOCATION: one-of(31, 32, 34, 35, 37, 38, 40, 41)
 - (D) OTHER INFORMATION: /note= "N = A, C, T or G"

- (ix) FEATURE:
 - (A) NAME/KEY: modified_base
 - (B) LOCATION: one-of(33, 36, 39, 42)
 - (D) OTHER INFORMATION: /note= "S = C or G"

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:16:

GTATACTATT GCGCCGGCTC CTCTGGTAAC NNSNNSNSN NSGATTATTG GGGTCATGGT

60

GCT

63

(2) INFORMATION FOR SEQ ID NO:17:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 30 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: single
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:17:

GTTACCAGAG GAGCCGGCGC AATAGTATAC

30

(2) INFORMATION FOR SEQ ID NO:18:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 36 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: single
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:18:

TACATTTTCA CCGACTTCAA TATGAATTGG GTTCGC

36

(2) INFORMATION FOR SEQ ID NO:19:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 36 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: single
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:19:

TACATTTTCA CCGACTTCTG CATGAATTGG GTTCGC

36

(2) INFORMATION FOR SEQ ID NO:20:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 36 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: single
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:20:

TACATTTTCA CCGACTTCTC TATGAATTGG GTTCGC

36

(2) INFORMATION FOR SEQ ID NO:21:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 36 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: single
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:21:

TACATTTTCA CCGACTTCGG GATGAATTGG GTTCGC

36

(2) INFORMATION FOR SEQ ID NO:22:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 36 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: single
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:22:

TACATTTTCA CCGACTTCTA AATGAATTGG GTTCGC

36

(2) INFORMATION FOR SEQ ID NO:23:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 9 amino acids
 - (B) TYPE: amino acid
 - (C) STRANDEDNESS:
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:23:

Ser Gln Thr Thr His Val Pro Pro Thr
1 5

(2) INFORMATION FOR SEQ ID NO:24:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 9 amino acids
 - (B) TYPE: amino acid
 - (C) STRANDEDNESS:
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:24:

Ser Gln Ala Thr His Met Pro Gly Thr
1 5

(2) INFORMATION FOR SEQ ID NO:25:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 9 amino acids
 - (B) TYPE: amino acid
 - (C) STRANDEDNESS:
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:25:

Ser Gln Thr Thr His Phe Pro Val Thr
1 5

(2) INFORMATION FOR SEQ ID NO:26:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 9 amino acids
 - (B) TYPE: amino acid
 - (C) STRANDEDNESS:
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:26:

Ser Gln Ala Thr His Tyr Pro Thr Thr
1 5

(2) INFORMATION FOR SEQ ID NO:27:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 9 amino acids
 - (B) TYPE: amino acid
 - (C) STRANDEDNESS:
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:27:

Ser Gln Cys Thr His Trp Pro Val Thr
1 5

(2) INFORMATION FOR SEQ ID NO:28:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 9 amino acids
 - (B) TYPE: amino acid
 - (C) STRANDEDNESS:
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:28:

Ser Gln Thr Thr His Val Pro Pro Thr
1 5

(2) INFORMATION FOR SEQ ID NO:29:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 9 amino acids
 - (B) TYPE: amino acid
 - (C) STRANDEDNESS:
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:29:

Ser Gln Ala Thr His Tyr Pro Ser Thr
1 5

(2) INFORMATION FOR SEQ ID NO:30:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 9 amino acids
 - (B) TYPE: amino acid
 - (C) STRANDEDNESS:
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:30:

Ser Gln Ala Thr His Ser Pro Ser Thr
1 5

(2) INFORMATION FOR SEQ ID NO:31:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 9 amino acids
 - (B) TYPE: amino acid
 - (C) STRANDEDNESS:
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:31:

Ser Gln Val Thr His Gly Pro Arg Thr
1 5

(2) INFORMATION FOR SEQ ID NO:32:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 9 amino acids
 - (B) TYPE: amino acid
 - (C) STRANDEDNESS:
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:32:

Ser Gln Gly Thr His Arg Pro Tyr Thr
1 5

(2) INFORMATION FOR SEQ ID NO:33:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 9 amino acids
 - (B) TYPE: amino acid
 - (C) STRANDEDNESS:
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:33:

Ser Gln Ile Thr His Val Pro Lys Thr
1 5

(2) INFORMATION FOR SEQ ID NO:34:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 9 amino acids
 - (B) TYPE: amino acid
 - (C) STRANDEDNESS:
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:34:

Ser Gln Leu Thr His Leu Pro Arg Thr
1 5

(2) INFORMATION FOR SEQ ID NO:35:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 9 amino acids
 - (B) TYPE: amino acid
 - (C) STRANDEDNESS:
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:35:

Ser Gln Pro Thr His Val Pro Pro Thr
1 5

(2) INFORMATION FOR SEQ ID NO:36:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 9 amino acids
 - (B) TYPE: amino acid
 - (C) STRANDEDNESS:
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:36:

Ser Gln Val Thr His Lys Pro Gly Thr
1 5

(2) INFORMATION FOR SEQ ID NO:37:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 9 amino acids
 - (B) TYPE: amino acid
 - (C) STRANDEDNESS:
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:37:

Ser Gln Leu Thr His Trp Pro Ser Thr
1 5

(2) INFORMATION FOR SEQ ID NO:38:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 9 amino acids
 - (B) TYPE: amino acid
 - (C) STRANDEDNESS:
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:38:

Ser Gln Leu Thr His Gly Pro Arg Thr
1 5

(2) INFORMATION FOR SEQ ID NO:39:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 9 amino acids
 - (B) TYPE: amino acid
 - (C) STRANDEDNESS:
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:39:

Ser Gln Leu Thr His Gly Pro Arg Thr
1 5

(2) INFORMATION FOR SEQ ID NO:40:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 9 amino acids
 - (B) TYPE: amino acid
 - (C) STRANDEDNESS:
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:40:

Ser Gln Glx Thr His Gly Pro Phe Thr
1 5

(2) INFORMATION FOR SEQ ID NO:41:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 10 amino acids
 - (B) TYPE: amino acid
 - (C) STRANDEDNESS:
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:41:

| | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Ser | Ser | Gly | Asn | Lys | Trp | Ala | Met | Asp | Tyr |
| 1 | | | | 5 | | | | | 10 |

(2) INFORMATION FOR SEQ ID NO:42:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 10 amino acids
 - (B) TYPE: amino acid
 - (C) STRANDEDNESS:
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:42:

| | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Ser | Ser | Gly | Asn | Tyr | Arg | Ala | Leu | Asp | Tyr |
| 1 | | | | 5 | | | | | 10 |

(2) INFORMATION FOR SEQ ID NO:43:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 10 amino acids
 - (B) TYPE: amino acid
 - (C) STRANDEDNESS:
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:43:

| | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Ser | Ser | Gly | Asn | Arg | Arg | Ala | Trp | Asp | Tyr |
| 1 | | | | 5 | | | | | 10 |

(2) INFORMATION FOR SEQ ID NO:44:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 10 amino acids
 - (B) TYPE: amino acid
 - (C) STRANDEDNESS:
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:44:

| | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Ser | Ser | Gly | Asn | Arg | Arg | Ala | Leu | Asp | Tyr |
| 1 | | | | 5 | | | | | 10 |

(2) INFORMATION FOR SEQ ID NO:45:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 10 amino acids
 - (B) TYPE: amino acid
 - (C) STRANDEDNESS:
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:45:

Ser Ser Gly Asn Gly Arg Ala Trp Asp Tyr
1 5 10

(2) INFORMATION FOR SEQ ID NO:46:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 10 amino acids
 - (B) TYPE: amino acid
 - (C) STRANDEDNESS:
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:46:

Ser Ser Gly Asn Ile Ser Ala Leu Asp Tyr
1 5 10

(2) INFORMATION FOR SEQ ID NO:47:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 10 amino acids
 - (B) TYPE: amino acid
 - (C) STRANDEDNESS:
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:47:

Ser Ser Gly Asn Gln Arg Lys Met Asp Tyr
1 5 10

(2) INFORMATION FOR SEQ ID NO:48:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 9 amino acids
 - (B) TYPE: amino acid
 - (C) STRANDEDNESS:
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:48:

Ser Gln Thr Thr His Val Pro Pro Thr
1 5

(2) INFORMATION FOR SEQ ID NO:49:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 9 amino acids
 - (B) TYPE: amino acid
 - (C) STRANDEDNESS:
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:49:

Ser Gln Val Thr His Arg Pro Leu Thr
1 5

(2) INFORMATION FOR SEQ ID NO:50:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 9 amino acids
 - (B) TYPE: amino acid
 - (C) STRANDEDNESS:
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:50:

Ser Gln Val Thr His Asp Pro Gly Thr
1 5

(2) INFORMATION FOR SEQ ID NO:51:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 9 amino acids
 - (B) TYPE: amino acid
 - (C) STRANDEDNESS:
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:51:

Ser Gln Val Thr His Cys Pro Ser Thr
1 5

(2) INFORMATION FOR SEQ ID NO:52:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 9 amino acids
 - (B) TYPE: amino acid
 - (C) STRANDEDNESS:
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:52:

Ser Gln Val Thr His Trp Pro Pro Thr
1 5